Remarks/Arguments:

Claims 1-25 are pending in the present application, of which claims 20-25 are added. In the Office Action dated February 8, 2005, the PTOL-326 indicates that the Examiner has allowed claims 11-13 and 15-19, and objected to claims 7-10 and 14 as depending from a rejected base claim. The Office Action further rejected claims 1-2 as obvious over an article by Cox et al (hereinafter, Cox) in view of ordinary skill in the art, and has rejected claims 1-6 over an article by Kim et al (hereinafter, Kim) in view of ordinary skill in the art.

It is noted that the form PTOL-326 accompanying the Office Action recites under "Disposition of Claims" that claims 15-19 are allowed and that claim 14 is objected to, but the "Detailed Action" pages recite that claims 11-19 are allowed. No detailed remarks assert a rejection or objection to claim 14. As claim 14 is independent but claims 15-19 that depend from it are allowed without objection, it is presumed that the PTOL-369 is in error with respect to claim 14, and that claim 14 is also allowed. Should the undersigned be mistaken, a particularized statement of any rejection or objection applying to claim 14 is requested so that the undersigned may adequately respond.

Claims 20-25 are added herein, and draw support from Figure 2B and the associated written description at page 8, line 10 through page 9, line 7, as well as claims 1, 2, 11 and 12. Independent claims 20 and 23 specifically recite that the elements of the codeword that are punctured/de-punctured are at locations described by the puncture sequences S_{max} and its subset S_1, read from memory. The "read from memory" element is to avoid an instance of a puncture sequence S_1 that is by happenstance a subset of S_{max}. The "locations described by the subset" element is to make explicit that the sequence describes which particular elements of the codeword to puncture or de-puncture. Dependent claims draw support from Figures 4 and 5, and the associated text at page 9, lines 22-27 and page 10, lines 16-24.

Claims 1-6 are not amended, and are seen to patentably distinguish over the references in light of the following remarks. Kim will be considered first as it is seen to provide more relevant detail.

Kim is directed to a rate compatible punctured serial concatenated convolutional code SCCC. In that Kim describes varying both an inner and an outer code (serial concatenation) to

achieve a variable rate code, new claims 20-25 are seen to distinguish in that each recites an encoder or decoder that encodes or decodes at a variable rate. See Kim, Fig. 1(a) for outer and inner encoders. Whereas Kim recites at page 2400, right-hand column, first paragraph that only a single rate encoder and decoder is used for variable coding rates, this statement is seen to apply to both the inner and outer encoder separately, so both the transmitter and the receiver each use an inner and separate outer encoder/decoder to achieve the variable rate codes. Were it otherwise, the code would not be concatenated. The two encoders/decoders are not seen as combinable with ordinary skill because the outer code is interleaved prior to application of the inner code. See Kim, Fig. 1(b). This is described particularly at Kim, page 2400, left-hand column, under the subtitle "*A. Overview of SCCC*".

More fundamentally, the Office Action appears to rely on Kim's description of a puncturing table, shared by the transmitter and receiver, as teaching that the puncture table is used to achieve a maximum code rate and a subset of it is used to achieve a minimum code rate. The Applicant contends that this is not what Kim teaches or describes. Kim recites at page 2400 that

> "The puncturing table consists of the systematic and parity sub-blocks each having P bits, where the two sub-blocks specify the puncturing patterns for the systematic and parity components, and P stands for the puncturing period. For **each** puncturing index k_s, we define an n_l x P binary puncturing table, PT_{ks}, where puncturing index k_s=0, 1, ...$(n_l$-1$)P$ that can be set according to channel conditions." (boldface added).

As the index k_s gives the coding rate R_{ks}, this is seen to describe a different puncturing table PT_{ks} for each different rate R_{ks}.

Kim's Fig. 2 bears this out. Four tables are shown, each having four entries for systematic bits and four entries for parity bits, and each puncturing table associated with a different coding rate. The highest coding rate is seen as R_0=2/3, associated with puncture table PT_0 that shows systematic bits 1, 1, 1, 1, and parity bits 0,0,0,0. All other rates are less than R_0=2/3 and vary from 8/15 to 1/3. For no other rate is the associated puncture table a subset of table PT_0 as the Office Action appears to assert in its rejection of claim 1. This is true even though the systematic bits are identical among the illustrated tables, because the parity

bits of no other table is a subset of the parity bits of table PT_0. Kim is seen to teach storing different puncture tables for a variety of coding rates.

The approach of Kim is seen to follow that generally described at page 4, lines 2-9 of the written description, where a different LDPC code (the lower row of Kim's puncture tables) is designated for each coding rate and channel (Kim adapts coding rate to adapt to a time varying channel at page 2399, right-hand column). The present application notes shortfalls with this approach at page 4, lines 6-9 and line 2 to page 5, line 7, in that it requires a large volume of storage for long codewords, and is computationally expensive.

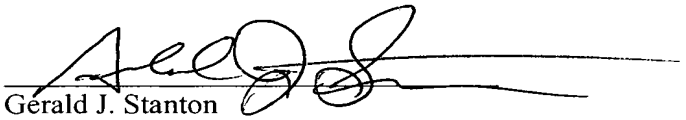
In contradistinction, claim 1 recites that the puncture sequence S_1 for a minimum code rate is a subset of the puncture sequence S_{max} for a maximum code rate. There is no need to store multiple tables for multiple code rates; a single table may be stored and lesser code rates taken from a subset of the single (maximum rate) table. Kim is not seen to disclose, teach, or suggest that an overall table may be used from which puncture sequences for lesser rates are a subset. Kim explicitly teaches away from such a modification at Fig. 2 by disclosing puncture tables for less than a maximum rate code that is not a subset of a puncture table PT_0 for his maximum rate code R_0=2/3. Even assuming arguendo that the various puncture tables of Kim may be accumulated into a conglomerate table, of which portions (the disclosed tables) are used selectively for various coding rates, Kim is not seen to use such a hypothetical conglomerate table to achieve a maximum coding rate. Claim 1 recites that the puncture sequence for a minimum code rate is a subset of the puncture sequence for the maximum code rate.

Cox is seen to take the same general approach as Kim. Cox recites at page 1724 two puncturing tables $a(1)$ and $a(2)$ [equations (17) and (18)] that are used to puncture a ½ rate convolutional mother code and achieve a resulting rate of 4/5 and 2/3, respectively. As with Kim, neither of the puncturing tables are subsets of one another. The few overlapping elements used for rate compatibility do not render the entire sequence (or table) a subset of the other. Cox is seen to suffer the same shortfalls respecting memory usage and computational/processing complexity that are described in the application and noted above with respect to Kim.

For the above reasons, claims 1, 5 and 6 are seen to patentably distinguish in their own right over both Kim and Cox as modified by ordinary skill noted in the Office Action. Claims 2-4 are seen as patentable for their dependence on claim 1. Further, new claims 20-25 are seen to distinguish over the cited references for the additional reasons detailed above (though it is not clear to the undersigned whether Cox uses a concatenated code to achieve a variable coding rate).

The Applicant respectfully requests that the Examiner review the cited art and rejections in light of the above remarks, and pass each of claims 1-25 to issue. The undersigned representative welcomes the opportunity to resolve any matters that may remain, formal or otherwise, via teleconference at the Examiner's discretion.

Respectfully submitted:



June 7, 2005
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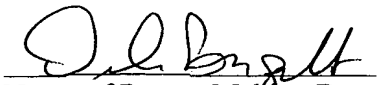

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